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PROGRESS REPORT OPERABLE UNIT 4 SILOS 1-4 FEBRUARY 1993

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Fernald Project

Remedial Investigation/ Feasibility Study

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Operable Unit 4
SILOS 1-4

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Introduction

The Remedial Investigation/Feasibility Study is the blueprint for cleanup at the U.S. Department of Energy's Fernald Environmental Management Project. The nature and extent of contamination at the Fernald site and surrounding areas is being thoroughly investigated so that appropriate remedial actions can be formulated and implemented.

The Fernald site has been divided into five sections, known as Operable Units, for environmental investigation and cleanup. The Operable Units were defined based on their location or the potential for similar technologies to be used in the ultimate cleanup.

During the course of the RI/FS effort, certain conditions are occasionally identified which call for more immediate action. These actions are called "Removal Actions" and are initiated when there is a need to accelerate cleanup activities to address releases or potential releases of hazardous substances. Removal Actions are coordinated with the U.S. EPA and the Ohio EPA.

Following is a progress report on Operable Unit 4 including its history, the current status of RI/FS activities, cleanup alternatives under consideration, and work that is being done to alleviate near-term concerns.

Background

K-65 Silos 1 and 2 contain radium-bearing radioactive wastes dating back to the Manhattan Project era. The two silos were reinforced with an earthen berm in 1963, and the berm was upgraded in 1983. Other past improvements included a 30-foot cap which was installed on top of the silo domes for added protection, and a polyurethane foam coating that was applied over the domes for weather protection. A Radon Treatment System (RTS) was constructed, and radon gas monitors were installed around the Fernald site boundary and in the immediate vicinity of Silos 1 and 2. Silo 3 contains dried uranium-bearing wastes, and Silo 4 is empty.

RI/FS Activities

Site Characterization: All initial site characterization activities associated with the Operable Unit 4 RI/FS have been completed. Data from the analyses of collected samples has been received and validated. The data has been compiled for use in the Remedial Investigation and Feasibility Study reports. Field activities included the completion of borings in the berms surrounding the silos, the soils beneath the silos, and the contents of the concrete structures. While collecting samples from the soils beneath the silos, perched groundwater was encountered. Additional field activities west of the K-65 silos include further characterization of the perched groundwater in the Operable Unit 4 area. This work was initiated February 8, 1993.

Reports: The Remedial Investigation (RI) Report for Operable Unit 4, including all validated analytical data from sampling activities, is presently being reviewed by DOE and contractor personnel at Fernald. The RI Report is on schedule for submittal to U.S. EPA by April 19, 1993. The RI Report will provide details about the nature and extent of contamination in Operable Unit 4 and establish remedial action objectives. The report also will include a Baseline Risk Assessment for Operable Unit 4. This Baseline Risk Assessment evaluates the pathways of exposure and the extent of exposure for existing conditions prior to any remedial activities in Operable Unit 4.

The compilation of the Feasibility Study (FS) Report is in progress. The FS is scheduled to be submitted to the U.S. EPA by September 10, 1993. In support of the FS development, two treatability study programs have been initiated. A Treatability Work Plan has been approved by the U.S. EPA for the evaluation of cementation and chemical extraction technologies for Operable Unit 4 wastes. This Treatability Work Plan describes a five-stage process for evaluating the applicability of these technologies.

The cementation study being conducted under this work plan involves the evaluation of different cement and additive formulations, focused on producing the best mix design which retards contaminant migration and provides acceptable physical properties such as volume and strength. Testing for durability, radon emanation, and radon leaching, is also in progress. Data from completed tests are being evaluated. Preliminary results indicate that cementation is a viable alternative; however, the resulting waste volume is as much as triple its original volume.

The chemical extraction portion of the study is focused specifically on the potential for removing certain radionuclides and heavy metals from the K-65 residues through acid/solvent digestion and extraction techniques. Testing for radon emanation and radon leaching of the vitrified waste stream, which contains the bulk of the radionuclides and heavy metals, is in progress. The remaining waste stream will require treatment prior to final disposition, due to the presence of elevated levels of radionuclides and heavy metals.

The Operable Unit 4 Treatability Study Report examining cementation and chemical extraction is on schedule to be submitted to the U.S. EPA in May 1993.

The second Operable Unit 4 Treatability Study Work Plan examining vitrification has been approved by the U.S. EPA. This plan specifically examines the technical feasibility of removing the waste materials from Silos 1, 2, and 3 and transforming them to glass in a high-temperature furnace. Samples of materials in the silos have been transferred to the DOE Pacific Northwest Laboratory in Richland, Washington, to perform the tests.

Preliminary results from this study have been received, and evaluation of this data is in progress. Preliminary results appear to be favorable in achieving significant waste volume reduction and retarded contaminant migration. A report documenting the results and data evaluation is also in progress. This Operable Unit 4 Treatability Study Report examining vitrification is on schedule to be submitted to the U.S. EPA in May 1993. Optimization testing has been initiated at Pacific Northwest Laboratory to identify an optimal range of additive-to-waste mixes for pilot testing.

These technologies are being tested to provide information to support the determination of which technology provides the most environmentally sound, cost effective and implementable method for treating the wastes prior to final disposal.

Remedial Design: Conceptual design engineering has been initiated for Operable Unit 4 for purposes of establishing preliminary design parameters and cost estimates. Conceptual engineering is proceeding based upon adapting representative remedial action alternatives for Silos 1, 2, and 3, as identified in available RI/FS documents. Conceptual engineering is proceeding in parallel with the RI/FS to allow for the prompt implementation of remedial action following issuance of the Record of Decision for Operable Unit 4.

Removal Actions

Silos 1 and 2 (Removal Action No. 4): This Removal Action was completed in December 1991 with the installation of bentonite clay over radium-bearing radioactive waste material in the K-65 silos.

Covering the silo contents with a layer of bentonite clay accomplished two key objectives. It substantially reduces the accumulation of radon in the silo headspace—between the surface of the residues and the dome—thereby reducing radon emissions to the environment. Secondly, it provides protection from potential releases to the environment in the event of a silo dome collapse.

The effectiveness of this Removal Action is determined by comparing the concentration of radon in the silo headspace before and after the placement of bentonite and examining other available monitoring data. Such a comparison indicates the bentonite has resulted in approximately a 99 percent reduction of radon accumulation in the silo headspace.

The DOE has completed a statistical evaluation of available data to demonstrate the effectiveness of the bentonite. This data was provided to the U.S. EPA in January 1993, for review and comment.

Cleanup Alternatives

Several cleanup alternatives have been identified for Operable Unit 4, involving a combination of technologies currently being assessed as part of the RI/FS for the silos. The alternatives include: 1) stabilizing and capping the waste in place; 2) removing and stabilizing/treating the waste with disposal in an engineered facility on Fernald site property, and 3) removing and stabilizing/treating the waste and shipping it to an approved off-site disposal facility.

More information about Operable Unit 4 is available in the Public Environmental Information Center (PEIC), where Fernald Project cleanup documents are kept in the Administrative Record. The PEIC is located in the JAMTEK building, 10845 Hamilton-Cleves Highway, Harrison, Ohio, 45030. The telephone number is (513) 738-0164.